Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Wireless Telecommunications Bureau and Office of Engineering and Technology Seek Comment on Petitions For Rulemaking Regarding The Citizens Broadband Radio Service	GN Docket No. 12-354 RM-11788 RM-11789

COMMENTS OF QUALCOMM INCORPORATED

Dean R. Brenner
Senior Vice President, Spectrum Strategy & Technology Policy

John W. Kuzin
Vice President & Regulatory Counsel

1730 Pennsylvania Avenue, NW
Suite 850
Washington, DC 20006
202.263.0020

July 24, 2017

CONTENTS

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Wireless Telecommunications Bureau and Office of Engineering and Technology Seek Comment on Petitions For Rulemaking Regarding The Citizens Broadband Radio Service	GN Docket No. 12-354 RM-11788 RM-11789

COMMENTS OF QUALCOMM INCORPORATED

QUALCOMM Incorporated ("Qualcomm") is pleased to provide these comments on the Petitions for Rulemaking filed by CTIA and T-Mobile USA seeking changes to the 3.5 GHz band licensing rules and in support of Qualcomm's own filing proposing changes to the emissions limits that currently apply to 3.5 GHz band operations.[1] It is critically important that the FCC move forward quickly to implement the changes covered herein so this important mid-band spectrum can be used for 4G LTE Advanced and 5G mobile broadband operations as soon as possible to enable better and faster mobile broadband for consumers. Acting quickly in this docket, along with other FCC actions to open up additional mobile spectrum bands, will help drive economic growth and positively impact virtually every facet of American life.

Qualcomm believes that the 3.5 GHz band should be made available using a proven licensing framework and with emissions limits that will not impact the existing protection of

[1] *See* FCC Public Notice DA 17-609, Wireless Telecommunications Bureau and Office of Engineering and Technology Seek Comment on Petitions For Rulemaking Regarding the Citizens Broadband Radio Service, GN Docket No. 12-354, RM-11788, RM-11789 (June 22, 2017) (also seeking comment on Qualcomm's June 19, 2017 *ex parte* letter relating to necessary revisions to the emissions rule).

operations on adjacent bands, while enabling channels wider than 10 MHz that are crucial for maximizing the potential of this band for 4G and 5G. The current rules place undue limits on the 3.5 GHz band PAL licenses and penalize operations with channels wider than 10 MHz even though the penalty has nothing to do with adjacent band operations.

INTRODUCTION and SUMMARY

Qualcomm is very excited by the possibility of deploying small cells and user devices that support the 3.5 GHz band because we believe that small cells will play a core role in enabling better, faster mobile broadband for consumers. In this regard, Qualcomm respectfully requests that the Commission consider changing the emissions limits that apply to 3.5 GHz CBSDs and End User Devices because the present limits require 4G LTE and 5G New Radio ("5G NR") devices operating with channel bandwidths greater than 10 MHz to engage in power backoff (so-called Additional-Mandatory Power Reduction or A-MPR), which diminishes the quality of mobile broadband service that could otherwise be provided to consumers. CTIA and Qualcomm previously raised this issue in this docket, but it is even more pressing today because the band is becoming increasingly important for 4G LTE and 5G NR operations.

Also, as Qualcomm previously recommended in this docket, 3.5 GHz spectrum rights should be awarded by geographic area licenses that are larger than census tracts and run for ten year terms with a renewal expectation like most other mobile service licenses awarded today via auction. Licensees also should be permitted to disaggregate or partition the spectrum assigned in these larger geographic licenses because it accomplishes the same purposes the FCC seeks to accomplish via the current shorter license term and census tract license areas; unlike census tract licenses with limited terms, the requested changes to the 3.5 GHz licenses support wide area licensed deployments and allow the spectrum marketplace to operate more effectively.

These requested modifications will help promote U.S. investment in the 3.5 GHz band and help the U.S. continue its global leadership as 5G begins to launch commercially around the world, beginning in 2019. Qualcomm requests that the FCC revise without delay the set of rules addressed herein so this important band can be put to use in early 2018.

DISCUSSION

I. Certain Changes To The 3.5 GHz Band Technical And Licensing Rules Are Needed To Support Successful Licensed 4G LTE Advanced And 5G Operations In This Band

A. The FCC Should Revise The Emissions Limits To Support 20 MHz and 40 MHz Wide Channels For Both PAL and GAA Operations

The Commission should revise the 3.5 GHz band emissions limits to appropriately support 4G LTE and 5G NR channels wider than 10 MHz. The current 3.5 GHz band emissions limits, which require significant signal attenuation outside the channel of operation, force mobile devices using a 20 MHz channel bandwidth to implement 4 dB Additional-Maximum Power Reduction ("A-MPR") to comply. Requiring the transmit power level for 20 MHz operations to be reduced by 4 dB significantly diminishes signal coverage, the quality of service, and the usefulness of the band for mobile operations. Imposing this penalty within the 3550-3700 MHz band provides no greater protection for adjacent channel operations and is not in the public interest. 40 MHz operations would require even greater A-MPR and suffer an even worse penalty, again without any corresponding benefit.

To enable 20 MHz-wide and 40 MHz-wide mobile broadband operations at the same transmit power levels at which 10 MHz LTE operations are permitted within the band and without impacting the adjacent bands, the FCC should revise Rule Section 96.41(e)(1) to provide 20 MHz operations with an additional 10 MHz on both sides of the operating channel edge (*i.e.*, 20 MHz total) to achieve the -25 dBm/MHz limit and provide 40 MHz operations an additional

30 MHz on both sides of the transmit channel edge (*i.e.*, 40 MHz total) to achieve the -25 dBm/MHz limit. The -13 dBm/MHz limit, which the FCC initially proposed to apply throughout the band, would apply from the channel edge up until the point where the -25 dBm/MHz limit begins, and protect adjacent channel operations within that portion of the band to the same -13 dBm/MHz emissions level that has worked well in other mobile bands, as the FCC has acknowledged in this proceeding.[2] As T-Mobile USA notes, failure to revise the emissions limits for the 3.5 GHz band will "threaten coverage, diminish the utility of the band, and depress deployments."[3]

Qualcomm's June 19, 2017 *ex parte* filing proposed revisions to the text of Rule Section 96.41(e) to implement the proposal.[4] We are not asking the FCC to modify the additional -40 dBm/MHz protection level in paragraph (e)(2) of Rule Section 96.41 the FCC adopted to protect operations below and above the 3550-3700 MHz band. Thus, our proposal will not have any increased impact on users in the adjacent bands. The proposed revisions are designed to enable wider bandwidth operation in the 3.5 GHz band at the same power level permitted for 10 MHz channels for channels located away from the 3550 MHz and 3700 MHz band edges. 3.5 GHz operations in channels on or near the band edge would continue to be constrained by the -40 dBm/MHz additional protection level requirement for adjacent bands.

The suggested revisions are consistent with the way in which the emissions mask is defined in 3GPP specifications, which scale with bandwidth and recognize that wider bandwidth

---

2 *See, e.g.,* Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, *Report and Order & Second Further Notice of Proposed Rulemaking*, FCC 15-47, 30 FCC Rcd 3959, ¶ 176 (2015).

3 T-Mobile USA Petition at 21.

4 *See* Qualcomm June 19, 2017 *Ex Parte* Filing in GN Docket No. 12-354.

channels require a wider roll-off bandwidth. Accordingly, Qualcomm respectfully requests that the FCC revise the emissions limits in Rule Section 96.41(e) as set out in our June 19, 2017 *ex parte* filing.

B. The 3.5 GHz Band Should Be Licensed Using Partial Economic Areas And Allow For Partitioning And Disaggregation Of Spectrum Rights

The FCC's present licensing framework for the 3.5 GHz band is administratively burdensome, overly complex, and introduces interference challenges between tens of thousands of adjacent census-tract-sized licensees. The present licensing approach using census tracts where there are over 74,000 census tracts in the U.S. can result in more than 500,000 discrete PAL licenses. This licensing system provides for a previously unforeseen number of border areas with bi-directional co-channel interference risks. As CTIA notes, the "three-tiered spectrum access regime is novel enough without introducing a licensing framework comprised of 74,000 geographic areas."[5]

Qualcomm agrees with CTIA and T-Mobile USA that the FCC should license the 3.5 GHz PALs on a Partial Economic Area ("PEA") basis for it will enable flexible network deployments and result in less interference problems and less administrative issues.[6] PEA licensing of PALs will allow licenses to deploy networks in targeted areas and readily expand those deployments as needed. To the extent the Commission wants to encourage opportunities in smaller service areas, it should revise its 3.5 GHz rules to permit partitioning and disaggregation via secondary market transactions, which have worked well for many other mobile bands.

The approach set out in the current licensing rules may invite rent-seeking spectrum speculators with limited interest in putting the band to use, particularly because the rules do not

---

5 CTIA Petition at 10; *and see* T-Mobile USA Petition at 16.

6 *See* T-Mobile USA Petition at 16-19.

include a build-out requirement and thus offer no incentive to deploy networks.

The FCC should revise its licensing rules for this band to better match the rules that apply to other licensed bands, such as the new 600 MHz band and the millimeter wave bands which are all licensed on a PEA basis, for this mid-band spectrum will serve a critical role in mobile providers' ability to provide users a seamless 5G experience. As Qualcomm has explained in this and other FCC spectrum proceedings, mobile operators will need a combination of low-band, mid-band, and high-band spectrum to service users and each band type will meet different needs.[7] Mid-band spectrum like the 3.5 GHz band will provide capacity and coverage benefits in dense urban and suburban markets, as T-Mobile USA notes.[8] Integration of this band into provider networks can occur seamlessly where the licensing terms for these bands are similar, which includes larger area PEA licenses and a ten-year license term with a renewal expectancy.

C. Ten-Year License Terms With A Right Of Renewal Will Ensure Successful Deployment Of Licensed Mobile Services In The 3.5 GHz Band

Qualcomm supports CTIA's and T-Mobile USA's proposal to adopt a ten-year license term with an expectation of renewal for PAL licenses because this approach will provide the necessary incentives to invest in PALs.[9] A ten-year licensing term is consistent with the Commission's proven approach in most other licensed mobile bands, and it has helped make the

---

[7] *See also* Dean Brenner, Qualcomm OnQ Blog, "Discussing 5G spectrum on Capitol Hill - Status and next steps on spectrum policy for Gigabit LTE & 5G in the U.S. and beyond" (July 20, 2017) *available at* https://www.qualcomm.com/news/onq/2017/07/20/discussing-5g-spectrum-capitol-hill.

[8] *See* T-Mobile USA Petition at 5.

[9] *See* CTIA Petition at 7-9; T-Mobile USA Petition at 11-13. Qualcomm also agrees with T-Mobile USA that the FCC should make available the total number of PALs applied for in a given area by eliminating Rule Section 96.29(d) and amending Rule Section 96.29(c) to allow a single applicant for a PAL license in a given area be allowed to receive a PAL license. The FCC also should allow applicants to bid for specific license blocks. *See* T-Mobile USA Petition at 15.

U.S. the global leader in wireless. The Commission also adopted this approach in the *Spectrum Frontiers* proceeding for the 28 GHz and 37/39 GHz bands that — like the 3.5 GHz band — will see network deployments comprised mostly of small cells.

A renewal expectancy is a critically important component of a mobile license for it will remove the uncertainty of having to regularly participate in auctions to retain access to PALs. The present 3.5 GHz licensing framework, with short three-year license terms and no renewal expectancy, severely undercuts the usefulness of the PAL tier. Offering mobile PAL licensees the option to operate on a GAA basis following the loss of a PAL in a subsequent auction does not provide the necessary certainty to justify significant investments in the band because GAA operations do not have interference protection from other CBRS users. Moreover, in areas where demand for spectrum is high, there is no certainty that mobile licensees who invested in the band as PAL operators will have sufficient access to GAA spectrum.

Echoing the points made in the CTIA and T-Mobile USA Petitions, the implementation of a three-tier licensing framework in the 3.5 GHz band is "novel enough," and the FCC should stick with well-established and proven licensing models in this band because mobile operators desperately need to incorporate this spectrum into their networks to continue meeting users' exponentially increasing data demands.

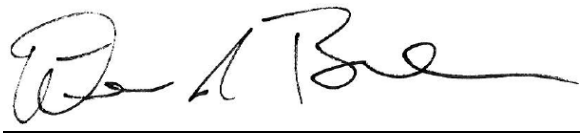
Qualcomm and our wireless industry partners are working hard through the standards process and developing chipsets and equipment to operate in this band, and the changes set out here will not delay these ongoing efforts. Accordingly, Qualcomm believes that 3.5 GHz spectrum rights should be allocated by using proven and successful larger geographic areas and ten-year license terms with an expectation of renewal, like most every mobile license awarded today via auction.

CONCLUSION

Qualcomm has done extensive work on small cell technology and on the spectrum access system set out in the FCC's rules for sharing spectrum with incumbent federal users, and we are very excited about the deployment of these technologies in the 3.5 GHz band starting soon. As explained herein, Qualcomm respectfully requests that the FCC: (i) change the licensing terms for the 3.5 GHz PALs to be licensed on a PEA basis with a ten-year term and a renewal expectancy, and (ii) modify the emissions limits for PAL and GAA operations to permit wider bandwidth mobile operations that 4G LTE networks can use today and 5G networks will soon use to support Gigabit mobile broadband services.

Respectfully submitted,

QUALCOMM INCORPORATED

By: 

Dean R. Brenner
Senior Vice President, Spectrum Strategy &
Technology Policy

John W. Kuzin
Vice President & Regulatory Counsel

1730 Pennsylvania Avenue, NW
Suite 850
Washington, DC 20006
202.263.0020

Attorneys for QUALCOMM Incorporated

Dated: July 24, 2017